



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/531,112	04/13/2005	Yoichi Nakagawa	MAT-8681US	2581
23122	7590	03/10/2006	EXAMINER	
RATNERPRESTIA P O BOX 980 VALLEY FORGE, PA 19482-0980			AU, GARY	
			ART UNIT	PAPER NUMBER
			2681	
DATE MAILED: 03/10/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/531,112	Applicant(s) NAKAGAWA ET AL.	
	Examiner Gary Au	Art Unit 2681	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 April 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

✓

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1 and 4-8 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent No. 6,996,380 (Dent).

Considering claim 1, Dent teaches a transmitter apparatus (base stations 12 – figure 1, col. 5 lines 9-25) for transmitting an information symbol sequence (information signals s1-s3 – figure 1, col. 6 lines 35-47) from a first radio station having an array antenna (antennas 14A-14C – figure 1, col. 6 lines 9-25) having M ($M > 1$) elements to a second radio station (col. 6 lines 9-25), the transmitter apparatus comprising: vector control means for producing a plurality of N ($N \leq M$) dimensional vectors depending upon propagation parameter featuring a propagation channel of between the first radio station and the second radio station (channel estimate matrix, col. 6 lines 35-47); and vector multiplexing means for producing vector-multiplexed symbol sequences in the number of N multiplexed by multiplying the plurality of N dimensional vectors on a plurality of symbol sequences containing the information symbol sequence (col. 10 line 47 – col. 11 line 2); whereby the vector control means transmits, at the array antenna,

Art Unit: 2681

the vector-multiplexed symbol sequences set such that, at the second radio station, a particular symbol sequence only is to be received of among a plurality of the symbol sequences whereas other symbol sequences are to be canceled (col. 6 lines 35-47).

Considering claim 4, Dent teaches reference symbol producing means for producing a reference symbol known also to the communicating terminal and propagation channel information receiving means for receiving information about propagation parameter transmitted from the communicating terminal determined from the reference symbol transmitted from the base station (channel estimate matrix, col. 6 lines 35-47).

Considering claim 5, Dent teaches the plurality of symbol sequences (information signals s1-s3 – figure 1, col. 6 lines 35-47), in part of all, are symbol-mapped based on modulation schemes different one from another (col. 8 lines 32-60).

Considering claim 6, Dent teaches the plurality of symbol sequences (information signals s1-s3 – figure 1, col. 6 lines 35-47), in part of all, are spread by code sequences different one from another (col. 8 lines 32-60, where the system is a CDMA network and all CDMA system identifies users with a unique code).

Considering claim 7, Dent teaches a radio communication (figure 1, col. 5 lines 9-25) method comprising: a step of transmitting, from a communicating terminal to a base

Art Unit: 2681

station having an array antenna having M elements (antennas 14A-14C – figure 1, col. 6 lines 9-25), a reference signal made up by reference symbols known to the base station (channel estimate matrix, col. 6 lines 35-47); a step for the base station to calculate a propagation parameter of between the communicating terminal and the base station from the received reference symbols in the number of M and produce a plurality of N dimensional vectors by using same (channel estimate matrix, col. 6 lines 35-47); a step for the base station to multiply a plurality of symbol sequences containing a to-be-notified information symbol sequence (col. 10 line 47 – col. 11 line 2), by the plurality of N dimensional vectors set such that at the communicating terminal the to-be-notified information symbol sequence only is to be received while other information symbol sequences are to be canceled, and to produce vector-multiplexed symbol sequences multiplexed and in the number of N (col. 6 lines 35-47); and a step of transmitting the vector-multiplexed symbol sequences from the base station to the communicating terminal (col. 5 lines 9-25).

Considering claim 8, Dent teaches a radio communication (figure 1, col. 5 lines 9-25) method comprising: a step of transmitting, from a base station (base stations 12 – figure 1, col. 5 lines 9-25) having an array antenna having M elements to a communicating terminal (antennas 14A-14C – figure 1, col. 6 lines 9-25), a reference signal made up by reference symbols known to the communication terminal (channel estimate matrix, col. 6 lines 35-47); a step for the communicating terminal to produce a propagation channel information symbol sequence containing a propagation parameter

Art Unit: 2681

of between the communicating terminal and the base station, from the received reference signal (channel estimate matrix, col. 6 lines 35-47); a step of transmitting the propagation channel information symbol sequence from the communicating terminal to the communication terminal (channel estimate matrix, col. 6 lines 35-47); a step for the base station to calculate the propagation parameter from the received propagation channel information symbol sequence and to produce a plurality of N dimensional vectors by using an analysis result of same (channel estimate matrix, col. 6 lines 35-47); a step for the base station to multiply a plurality of symbol sequences containing a to-be-notified information symbol sequence (col. 10 line 47 – col. 11 line 2), by the plurality of N dimensional vectors set such that at the communicating terminal the to-be-notified information symbol sequence only is to be received while other information symbol sequences are to be canceled, and to produce vector-multiplexed symbol sequences multiplexed and in the number of N (col. 6 lines 35-47); and a step of transmitting the vector-multiplexed symbol sequences from the base station to the communicating terminal (col. 5 lines 9-25).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2681

4. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 6,996,380 (Dent) as applied to claim 1 above, and further in view of US Patent No. 6,463,105 (Ramesh).

As to claim 2, Dent teaches propagation channel analyzing means for producing a propagation channel matrix as the propagation parameter (channel estimate matrix, col. 6 lines 35-47), the vector control means being to produce a plurality of N dimensional vectors of the propagation channel matrix (col. 10 line 47 – col. 11 line 2) but fails to disclose it is obtained by singular-value decomposition (equation 7, col. 7 line 64 – col. 8 line 7).

In an analogous art, Ramesh teaches singular-value decomposition (col. 2 lines 42-53).

It would have been obvious for one of ordinary skill in the art at the times the invention was made to modify Dent's system to include singular-value decomposition, as taught by Ramesh, for the advantage of giving good performance (col. 2 lines 42-53).

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 6,996,380 (Dent) as applied to claim 1 above, and further in view of US Patent No. 6,850,741 Lei et al. (Lei).

As to claim 3, Dent teaches propagation channel analyzing means for producing a propagation channel matrix as the propagation parameter (channel estimate matrix, col. 6 lines 35-47), wherein said vector control means produces a plurality of N

Art Unit: 2681

dimensional vectors of the correlation matrix of the propagation channel matrix (col. 10 line 47 – col. 11 line 2) but fails to disclose it is obtained by eigen-value decomposition.

In an analogous art, Lei teaches eigen-value decomposition (col. 2 lines 35-50).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify Dent's system to include eigen-value decomposition, as taught by Lei, for the advantage of improving downlink performance (col. 2 lines 35-50).

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gary Au whose telephone number is (571) 272-2822. The examiner can normally be reached on 8am-5pm Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lester Kincaid can be reached on (571)272-7922. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Application/Control Number: 10/531,112

Page 8

Art Unit: 2681

GA


NICK CORSARO
PRIMARY EXAMINER